



Strand VI: Probability and Discrete Mathematics

**Standard I: Probability** - Students develop an understanding of the notion of certainty and of probability as a measure of the degree of likelihood that can be assigned to a given event based on the knowledge available, and make critical judgments about claims that are made in probabilistic situations.

- Key Ideas:
- 1. Students develop an understanding of the concepts of chance and uncertainty.
  - 2. Students express the likelihood of chance events in terms of probabilities.
  - 3. Through experiments students learn that some outcomes are affected by prior events, while others are independent.
  - 4. Students also learn to examine outcomes and search for explanations, and they realize the difference between probabilities determined from observations and probabilities derived mathematically.
  - 5. Making predictions and decisions in the face of uncertainty are essential skills for coping with the modern world.

Elementary Benchmark	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
1. Explain the difference between chance and certainty and give examples to illustrate their understanding.					
2. Compare events and describe them as “more likely” or “less likely” and use the language of fractions to describe simple probabilities.					
3. Conduct experiments with concrete objects to explore concepts and develop an intuitive understanding of how the conditions of the experiment can affect the outcome.					
4. Conduct experiments, record the outcomes, examine those outcomes to determine if they make sense and search for explanations of the outcomes.					
5. Conduct probability experiments and simulations to model and solve problems.					



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Standard 2: Discrete Mathematics - Students investigate practical situations such as scheduling, routing, sequencing, networking, organizing and classifying, and analyze ideas like recurrence relations, induction, iteration, and algorithm design.

- Key Ideas:
- 1. Problems involving counting and arranging finite collections of objects occur in many applications.
  - 2. Concepts of sets and set relationships give students useful tools for representing problems.
  - 3. Many important practical applications involve networks.
  - 4. Many important practical applications are modeled by recurrence relations.
  - 5. Mathematical applications frequently require students to develop their own procedures for solving problems.
  - 6. Applications of discrete mathematics drawn from many important practical situations introduce students to contemporary uses of mathematics.

Elementary Benchmark	Kindergarten	Grade 1	Grade 2	Grade 3	Grade 4
1. Use manipulatives and diagrams to explore problems involving counting and arranging objects.					
2. Explore sets and set relationships by sorting and classifying objects.	<b>Create, explore, and describe shapes</b> <b>G.GS.00.02</b> Identify, sort and classify objects by attribute and identify objects that do not belong in a particular group.	<b>Count, write, and order numbers</b> <b>N.ME.01.03</b> Order numbers to 110; compare using the phrases: same as, more than, greater than, fewer than; use = symbol. Arrange small sets of numbers in increasing or decreasing order, e.g., write the following from smallest to largest: 21, 16, 35, 8. <b>Add and subtract whole numbers</b> <b>N.MR.01.09</b> Compare two or more sets in terms of the difference in number of elements.			
3. Explore situations in which they model and trace paths using figures consisting of vertices connected by edges.					
4. Explore now-next patterns.					
5. Explore, develop and invent their own algorithms to accomplish a task or to solve numerical problems.		<b>Add and subtract whole numbers</b> <b>N.FL.01.16</b> Compute sums and differences up to two-digit numbers using number facts and strategies, but no formal algorithm.			
6. Use discrete mathematics concepts as described above to model situations and solve problems; and look for whether or not there is a solution (existence problems), determine how many solutions there are (counting problems) and decide upon a best solution (optimization problems).					